

**Dr. Alexander E. MacDonald**

Deputy Assistant Administrator for Laboratories and Cooperative Institutes  
Director, Earth System Research Laboratory (ESRL)  
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**EDUCATION**

Ph.D. in Meteorology (Minor in Computer Science), University of Utah, 1975  
Master of Science, Meteorology, University of Utah, 1973  
Bachelor of Science, Mathematics/Physics, Montana State University, 1967  
USAF Weather Course Certificate, Meteorology, St. Louis University, 1968

**PROFESSIONAL EXPERIENCE**

2006: Deputy Assistant Administrator, Laboratories and Cooperative Institutes,  
OAR Director, Earth System Research Laboratory, NOAA  
1988 – 2006: Director, Forecast Systems Laboratory, NOAA  
1983 – 1988: Director of the Program for Regional Observing and Forecasting Services  
(PROFS), Environmental Research Laboratories (ERL), NOAA  
1980 – 1982: Chief of PROFS, Exploratory Development Group, ERL, NOAA  
1975 – 1980: Techniques Improvement Meteorologist in the Scientific Services  
Division, Western Region National Weather Service, NOAA in Salt Lake City  
1967–1971: Air Force Officer of the U.S. Air Force

**CAREER HIGHLIGHTS**

- Created Science On a Sphere<sup>®</sup> or (SOS), a multimedia system that uses high-speed computers, advanced imaging techniques, and strategically placed projectors to display full-color animated images of satellite, geophysical and astronomical data on a sphere. Now installed in 80 locations worldwide, educating 25 million a year on planetary science
- Worked in the White House with Vice President Al Gore to establish the GLOBE Program (to improve K-12 science education) and was awarded the Distinguished Presidential Rank Award for that effort
- Earned two patents: one in 2002 for “Atmospheric Sondes and Method for Tracking”; and in 2005 for the invention and development of a spectacular visualization system and outreach tool, Science On a Sphere<sup>®</sup>
- Contributed to the development of NOAA’s Scientific Integrity Policy and joined Dr. Jane Lubchenco, NOAA’s Administrator, and top science officials in a White House meeting with the President’s Science Advisor, Dr. Holdren, who lauded those efforts
- Acting Chair NOAA’s Research Council 2010-2012
- Lead a comprehensive research effort on wind and solar energy, collaborating with other agencies and private partners
- Leader in the concept development of the use of Unmanned Aircraft Systems for weather and climate prediction

- Work with the nation's operational weather agencies with a program to improve weather and climate prediction called Earth System Prediction Capability
- NOAA member of the National Unified Prediction Capability program
- Developed the concept and supported research for the Weather In-Situ Deployment Optimization Method (WISDOM) that advances hurricane research
- Key developer in the advanced global weather prediction models the FIM and NIM
- Working with the ESRL team developing the GPU-based computing capabilities, which offer promise to increase the computational capabilities of weather and climate models several fold, while decrease their costs significantly
- Developed a new and unique mesoscale weather prediction model named QNH (for quasi-nonhydrostatic)
- Led the completion of successful external review and follow-ups of all NOAA's Office of Research Laboratories
- Aggressively support the next generation of NOAA scientists at the Earth System Research Laboratory by promoting various student hiring programs including those that bring in minorities and underrepresented communities
- Led Forecast Systems Laboratory in parallel computing which resulted in the development, installation, and operation of a High-Performance Computing System (HPCS) named JET
- Developed the concept of diagnosis of three-dimensional water vapor using a GPS (Global Positioning System)

## AWARDS

- Fellow American Meteorological Society (AMS)
- Fellow Colorado State University Cooperative Institute for Research in the Atmosphere (CIRA)
- Co-recipient of NOAA Bronze Medal for "Developing a NOAA Administrative Order on Scientific Integrity Policy and accompanying Handbook on Scientific Misconduct"
- Finalist for the Service To America Awards (2008)
- Tech Museum Laureate Award (2003)
- Presidential Rank Award; Meritorious (2001 and 2007)
- The Federal 100 Award (2001)
- Presidential Rank Award; Distinguished (1997)
- Department of Commerce Gold Medal for his leadership in Technology Transfer (1993)
- Department of Commerce Bronze Medal for his Accomplishments in the National Weather Service Automation of Field Operations and Services Program (1980)

## PUBLICATIONS

- MacDonald, A. E., J. Middlecoff, T. Henderson and J. L. Lee (2011), A General Method for Modeling on Irregular Grids, *International Journal of High Performance Computing Applications*, 10.1177/1094342010385019.
- Xie, Y. and A. E. MacDonald (2011), Selection of Momentum Variables for a Three-Dimensional Variational Analysis, *Pure And Applied Geophysics*, 10.1007/s00024-

011-0374-3.

- Lee, J. L., R. Bleck and A. E. MacDonald (2010), A Multistep Flux-Corrected Transport Scheme, *Journal of Computational Physics*, 229(24), 9284-9298, 10.1016/j.jcp.2010.08.039.
- Bleck, R., S. G. Benjamin, J. L. Lee and A. E. MacDonald (2010), On the Use of an Adaptive, Hybrid-Isentropic Vertical Coordinate in Global Atmospheric Modeling, *Monthly Weather Review*, 138, 2188-2210, 10.1175/2009MWR3103.1.
- Lee, J. L. and A. E. MacDonald (2009), A Finite-Volume Icosahedral Shallow-Water Model on a Local Coordinate, *Mon. Wea. Rev.*, 137, 1422-1437, 10.1175/2008MWR2639.1.
- Lee, J. L., W. Lee and A. E. MacDonald (2006), Estimating vertical velocity and radial flow from Doppler radar observations of tropical cyclones, *Quarterly Journal of the Royal Meteorological Society*, 132(614, Part A), 125-145, 10.1256/qj.04.77.
- MacDonald, A. E. (2005), A global profiling system for improved weather and climate prediction, *Bulletin Of The American Meteorological Society*, 86(12), 1747-1764, 10.1175/BAMS-86-12-1747.
- Girz, C., A. E. MacDonald, R. Anderson, B. Lachenmeier, R. S. Collander, R. B. Chadwick, R. Moody, J. Cooper, G. Gano, S. Katzberg, T. Johnson, B. Russ and V. U. Zavorotny (2004), Results of the recent GAINS flight test, *Next Generation In Scientific Ballooning*, 33(10), 1642-1647, 10.1016/j.ars.2003.06.021.
- Lee, J. L., Y. Kuo and A. E. MacDonald (2003), The vorticity method: Extension to mesoscale vertical velocity and validation for tropical storms, *Quarterly Journal Of The Royal Meteorological Society*, 129(589, Part C), 1029-1050, 10.1256/qj.01.219.
- Robert J. Serafin, Alexander E. MacDonald, and Robert L. Gall 2002: Transition of Weather Research to Operations: How the National Weather Service can implement, in a timely and continual manner, the rapid technological advances in the computing and software arena. *Bulletin of the American Meteorological Society*. 83(3)
- MacDonald, A. E., Y. Xie and R. Ware (2002), Diagnosis of three-dimensional water vapor using a GPS network, *Monthly Weather Review*, 130(2), 386-397.
- Girz, C.M.I.R., A. E. MacDonald, F. Caracena, R. L. Anderson, T. Lachenmeier, B. D. Jamison, R. S. Collander and E. C. Weatherhead (2002), GAINS - A global observing system, *Advances in Space Research*, 1343-1348.
- MacDonald, A. E. (2001), The Role Of Advanced Computing In Future Weather Prediction, *World Scientific*, 240-250.
- MacDonald, A. E. (2001), The wild card in the climate change debate, *Issues In Science And Technology*, 17(4), 51-56.
- Lee, J. L. and A. E. MacDonald (2000), QNH: Mesoscale bounded derivative initialization and winter storm test over complex terrain, *Monthly Weather Review*, 128(4), 1037-1051.
- MacDonald, A. E., J. L. Lee and S. Sun (2000), QNH: Design and test of a quasi-nonhydrostatic model for mesoscale weather prediction, *Monthly Weather Review*, 128(4), 1016-1036.
- MacDonald, A. E. and J. L. Lee (2000), The Use of Quasi-Nonhydrostatic Models for Mesoscale Weather Prediction, *J. Atmos. Sci.*, 57, 2493-2517.

- Lee, M-S, Y. Xie and A.E. MacDonald (1997), Numerical experiments for variational data assimilation using shallow water equations model and its adjoint model, *J. Korean Meteor. Soc*, 33, 609-626.